Appendix A – Utilities in the Delta – Status and Trends

Introduction

The major utilities produced, stored, and conveyed within the Delta are water, gas, fuel, electricity, waste water treatment plants, and telecommunication services. The infrastructure used to provide these utilities are generally financed, constructed, operated, and maintained by private or municipal utility companies (refer to Table A-1).

Table A-1:
Utilities Within the Delta

Owner	Utility Provided
Pacific Gas and Electricity (PG&E)	• Electricity transmission lines • Electricity power plants • Natural gas pipelines • Natural gas storage field
Western Area Power Administration (WAPA)	• Electricity transmission lines
East Bay Municipal Utility District (EBMUD)	• Water conveyance (Mokelumne Aqueduct)
Kinder Morgan	• Gasoline pipelines
Various (including Cingular and Verizon)	• Telecommunications

Utilities within the Delta are largely found around its periphery, but some major utilities cross Delta from east to west. Figure A-1 provides an overview of information available on the location of major utilities for the sole purpose of identifying areas of high utility use and areas of low utility use. This same information is provided on individual maps for each utility type on the following pages. In general, each utility occupies its own corridor. Of particular interest is the common corridor that crosses the southern Delta for a major water aqueduct, a fuel pipeline and the BNSF railroad.

Electricity Transmission

Pacific Gas & Electric (PG&E), Sacramento Municipal Utility District, and Western Area Power Administration oversee most of the electrical transmission lines and provide local electric service within the Delta. The regional transmission lines interconnect California loads and generation with loads and generation in the Pacific Northwest. More than 800 miles of transmission lines and more than 60 substations lie within the Delta boundaries. Several electrical peaking plants adjoining the Delta depend on these transmission lines (Figure A-2).

Three major electric transmission lines cross the Delta: the California Oregon Transmission Project (COTP) operated by the Western Area Power Administration; the PG&E 500 kV Table Mountain-Tesla line, and the PG&E Vaca-Dixon-Tesla line. The

three lines through the Delta are operated as a coordinated grouping, with maximum imports or exports limited to provide some joint redundancy to help ensure reliability.

The combined load on these three lines is typically around 4000 MW, although under some circumstances it can be as high as 4800 MW (Mirzadeh 2006). This is approximately ten percent of statewide summer loads, which is less than the required planning reserve margin of 15 percent. However, there may be other outages that occur at the same time as this disruption, so under some circumstances the loss of all three lines could cause operating problems.

Table A-2:
Electricity Transmission Lines within the Delta

Capacity of Line	Length	Structures
500 kV	60 circuit miles	240 towers
230kV	220 circuit miles	560 towers
115 kV	310 circuit miles	2050 towers/poles
60 kV	230 circuit miles	3500 towers/poles

PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (RERC). PG&E has an annual requirement to plan augmentations to their transmission line grid to the California Independent System Operator (CAISO). Within this plan, some expansion of distribution lines is forecast over the next five years, most likely in the secondary zone.

The low probability of new reservoirs, the chance of some dam decommissioning and the increased demand for electricity within the Pacific Northwest, suggests that less surplus hydroelectric power is likely to be available for purchase in California (URS 2007c). However, the Trans Bay Cable Project has been proposed by the Pittsburg Power Company, which consists of a high voltage direct current (HVDC) power line to be installed underwater from a terminus in Pittsburg to San Francisco, through Suisun Bay (City of Pittsburg, website). The project plans to transmit 400 megawatts of electrical power, which represents enough new energy resource to power 400,000 homes.

Water Conveyance – Mokelumne Aqueduct

The Mokelumne Aqueduct (pipeline), consisting of three pipelines, is the main municipal water conveyance facility for 1.3 million people in the East Bay Municipal Utility District (EBMUD). The aqueduct, which consists of sections of elevated (10 miles) and buried pipe (4 miles), crosses five Delta islands/tracts (Orwood Tract, Woodward Island, Jones Tract, Roberts Island, and Sargent-Barnhart Tract). In addition, the Aqueduct crosses three rivers; San Joaquin River, Middle River and Old River, and has over water segments at Trapper Slough and Werner Cut (Figure A-3).

Natural Gas Storage and Transmission

PG&E owns and operates 434 miles of natural gas pipelines that serve local gas fields and regional pipelines. They are regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission. PG&E also operate the company's largest natural gas storage field which is located on McDonald Island (Figure A-4).

PG&E operates the storage field by adding gas to storage during summer when demands are lower, and withdrawing gas during peak winter days when demand is highest. This storage is integral to ensuring the reliability of winter gas supplies to Northern California. **On a peak winter day natural gas from this storage location can supply as much as 20 to 25 percent of supplies needed in Northern California**.

Line 57B transports natural gas from the McDonald Island Storage Field. Due to the widespread economic consequences of a disruption to this pipeline, PG&E is constructing Line 57C to parallel Line 57B where that pipeline is most at risk.

Table A-3:
Gas Pipelines (>60 psig) Operating Within the Delta

Pipeline	Length
Backbone (L400/401)	83 miles
Local Transmission/DFM	156 miles
Gas Gathering	135 miles
McDonald Island Storage	33 miles
StanPac	27 miles

Gas well depletion in the Delta areas has resulted in a reduction of PG&E's gas gathering facilities. Other than the construction of Line 57C from the McDonald Island Storage Field, there are no immediate plans to change PG&E's gas infrastructure in the Delta. Despite this, an increased demand for natural gas resources is forecast (EIA, 2007).

Natural Gas and Oil Production

Natural gas production is an important economic activity within the Delta. About 240 wells in the study area were producing in 2004 and 2005 (URS 2007c). The value of production per day is estimated to be $871,000 (see Table A-4).

Oil production in the Delta is limited and estimated at probably less than $5,000 per day for the entire study area.

Table A-4
Summary of Natural Gas Producing Wells and Production by Analysis Zone, 2004 and 2005, in Order of Average Dollar Value of Production Per Day

Analysis Zone Name	2005 Production mcf1	2005 Number of Producing Wells	2004 Production mcf1.	2004 Number of Producing Eells	Mil $ Gross Value of Production Per Day, 2004 and 20052
McDonald_Tract	34,084,609	69	38,808,407	69	$0.5452
Brannan-Andrus Island	5,117,858	33	8,499,520	33	$0.1019
Twitchell_Island	2,672,959	9	3,932,994	9	$0.0494
Zone 70	2,082,197	30	3,007,402	33	$0.0381
Union_Island 1	1,469,947	8	1,579,767	7	$0.0228
RD 17 Mossdale	1,344,390	4	685,106	3	$0.0152
Netherlands 3	990,067	3	568,932	2	$0.0117
Tyler_Island 2	1,244,520	9	311,499	9	$0.0116
Roberts_Island 1	566,664	6	842,354	7	$0.0105
Moore Tract 2	317,030	4	672,701	5	$0.0074
TOTAL, including all other analysis zones	53,649,080	241	62,777,828	244	$0.8708

1 mcf is thousand cubic feet
2 Based on wellhead price of $5.46 per mcf

Fuel Transmission

Kinder Morgan Energy Partners (KMEP) operates several product pipelines, which carry gasoline and aviation fuel across the Delta from Bay Area refineries to depots in Sacramento and Stockton for distribution to Northern California and Nevada. These carry approximately 50 percent of transportation fuel used in that region. Limited information is available on the location of these pipelines; however they are thought to include the following:

- KMEP Concord to Stockton and Bradshaw pipeline;
- KMEP Concord to Sacramento and Rocklin pipeline (connects to Reno and Chico pipeline systems, and serves the Naval Air Station at Fallon, NV);
- KMEP Concord to Fresno pipeline;
- KMEP Concord to Suisun pipeline (serves Travis Air Force Base); and
- Navy Concord to Ozol pipeline.

Given security issues, no information is available for whether Kinder Morgan plans to augment their network of pipelines in the future. Also, given the rapidly changing technologies in the energy industry, the outlook for future investments is unclear. Figure

A-5 shows the location of the Kinder Morgan product pipeline and gas and oil production fields in the Delta.

Other Utilities

Other utilities within the Delta include:

- Telecommunication towers,
- Wastewater treatment plants

The locations of these utilities close to the periphery of the legal Delta (Figure A-2 and Figure A-6) make them less at risk due to flooding. Similar to transmission lines, telecommunication towers would be most susceptible to seismic hazards.

City of Stockton wastewater treatment facilities are located on Zone 159 and Roberts Island in the 100-year floodplain. The primary and secondary treatment facility is on the east side (Zone 159) and the tertiary facility is on the west side (Roberts Island) of the river (Gharegozloo, 2006). Protection is by the San Joaquin River levees; there are no additional levees around the facilities. If Zone 159 were to flood wastewater service to 280,000 people could be lost. If Roberts Island floods, especially in an event not related to high river flows, the release of secondary treated effluent to the San Joaquin River may impair the ability to use Delta water for other purposes.

Ironhouse Sanitation District owns about 95% of Jersey Island which is used for wastewater disposal by land application (Skrel, 2006). If Jersey Island were lost, Ironhorse could store wastewater in ponds temporarily, but only up to 2 months in the best of conditions. They provide service for about 30,000 people. DRMS assumed that if Jersey island floods for more than a week (wet conditions), or more than a month (dry conditions) then 30,000 people would lose wastewater service. Increased urbanization of land use will increase the need for water and wastewater services to service these new properties. Where urbanization occurs within the Secondary Zone of the Delta, any new utilities are at risk due to flooding. For example, an urban development project proposed for 11,000 houses on Stewart Tract would be protected by a levee system engineered to provide 1 in 200 year flood protection. This land was 10 feet under water in 1997 (SFGate news article September 25th 2005). Even with “200 year protection,” the island would still have a 14 percent likelihood of failure in the next 30 years.

Context Memorandum: Utilities

Iteration 1: June 22, 2007

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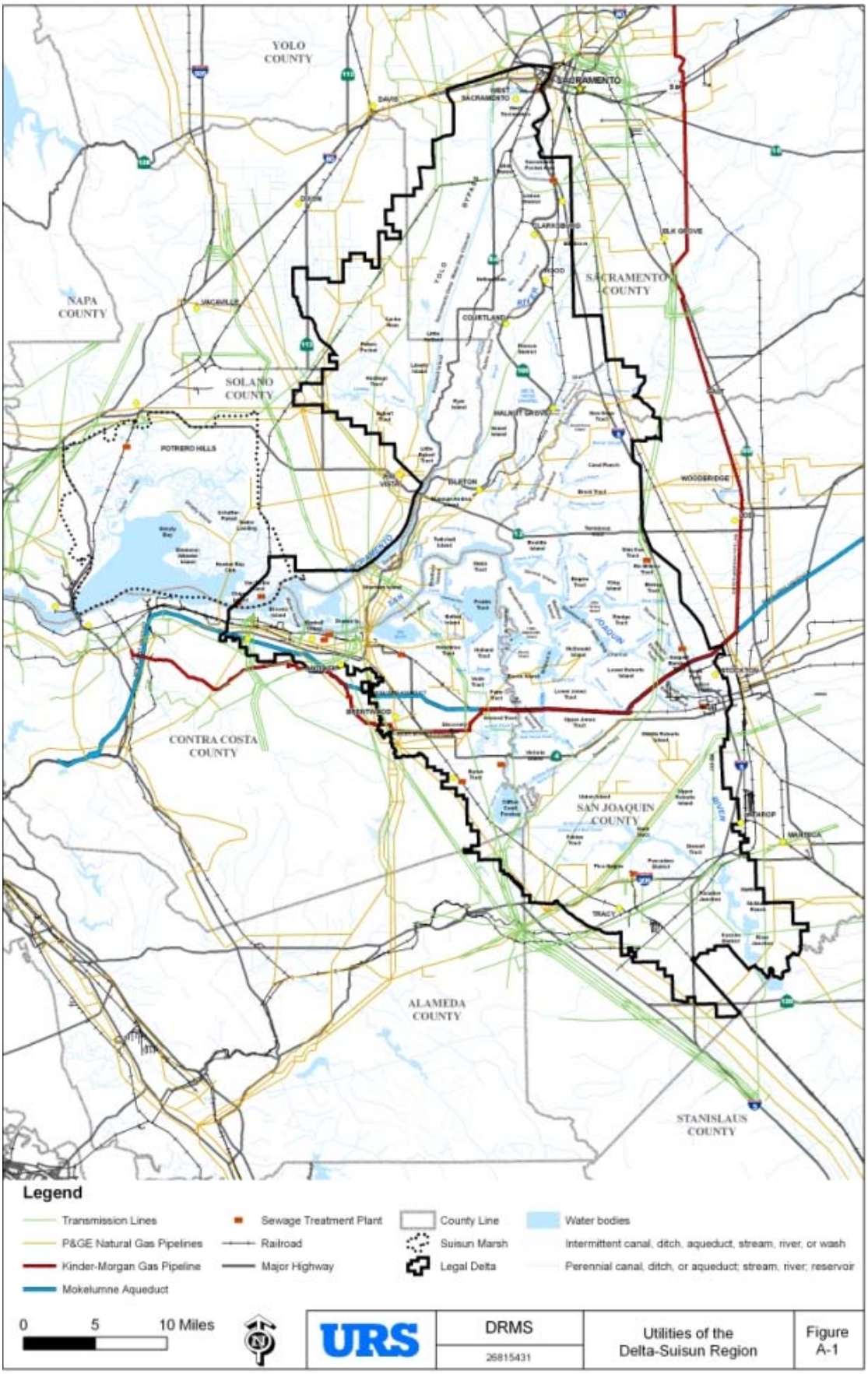
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SACRAMENTO
NAPA COUNTY
SACRAMENTO COUNTY
SOLANO COUNTY
CONTRA COSTA COUNTY
SAN JOAQUIN COUNTY
ALAMEDA COUNTY
STANISLAUS COUNTY
Legend
Transmission Lines
P&GE Natural Gas Pipelines
Kinder-Morgan Gas Pipeline
Mokelumne Aqueduct
Sewage Treatment Plant
Railroad
Major Highway
County Line
Suisun Marsh
Legal Delta
Water bodies
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream, river; reservoir
0 5 10 Miles
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DRMS
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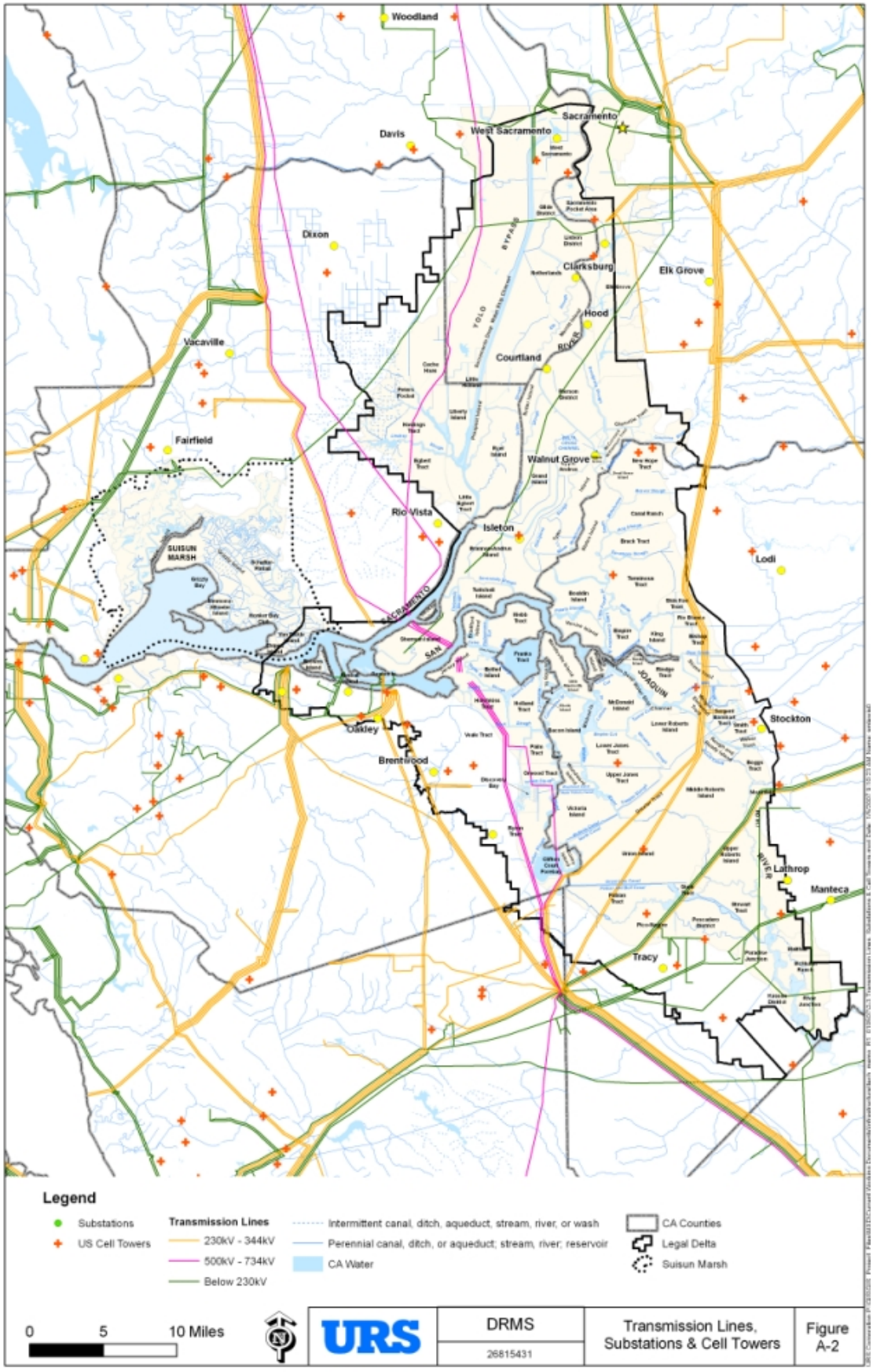
Utilities of the Delta-Suisun Region
Figure A-1

1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Sacramento
Dixon
Clarksburg
Elk Grove
Hood
Courtland
Vacaville
Fairfield
Walnut Grove
Rio Vista
Isleton
Lodi
SUISUN MARSH
SACRAMENTO
SAN JOAQUIN
Oakley
Brentwood
Stockton
Lathrop
Manteca
Tracy
Legend
Substations
US Cell Towers
Transmission Lines
230kV - 344kV
500kV - 734kV
Below 230kV
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream, river; reservoir
CA Water
CA Counties
Legal Delta
Suisun Marsh
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10 Miles
URS
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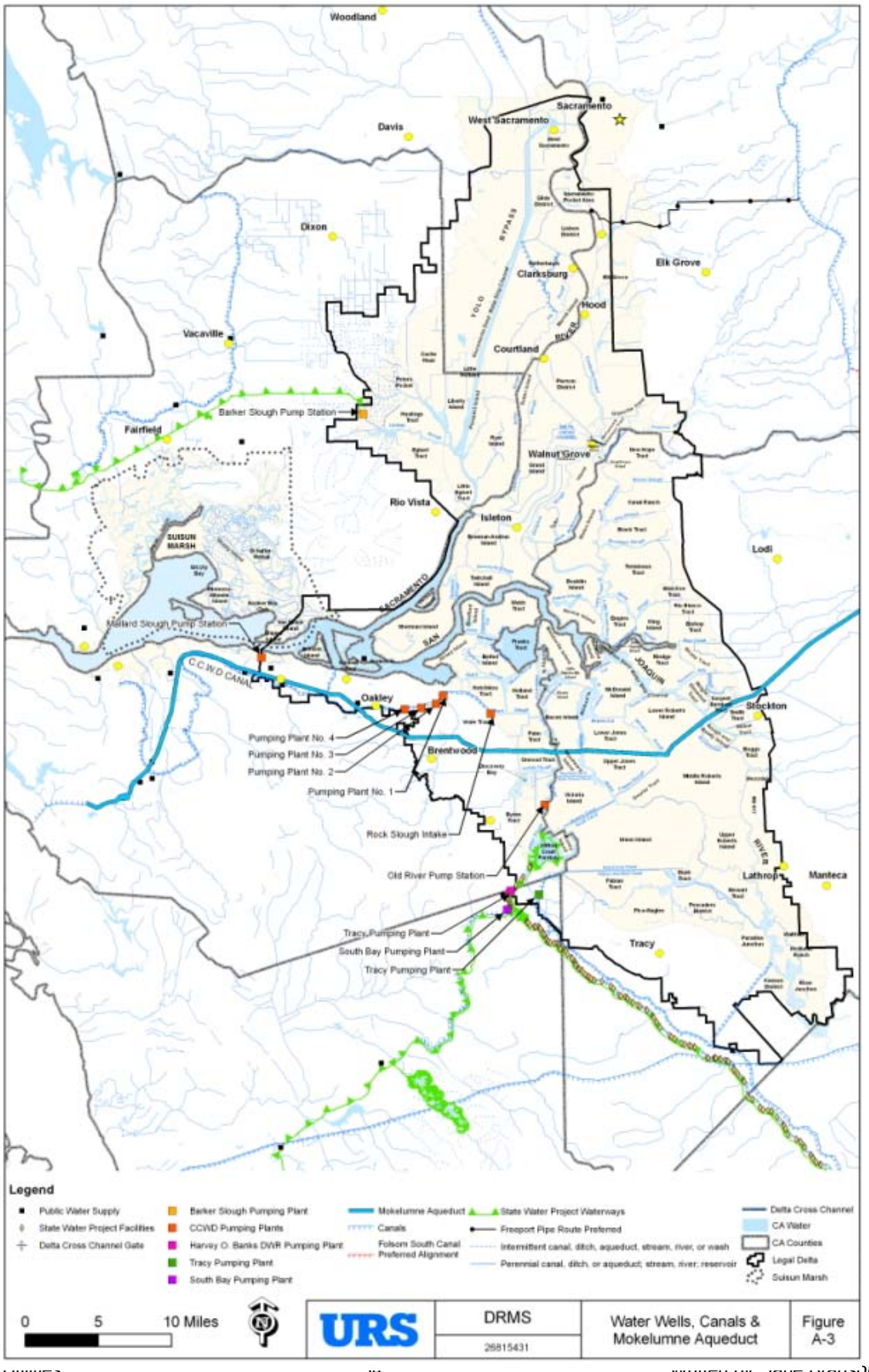
Transmission Lines, Substations & Cell Towers
Figure A-2

1


Woodland
Davis
West Sacramento
Sacramento
Dixon
Elk Grove
Clarksburg
Hood
Vacaville
Courtland
Barker Slough Pump Station
Fairfield
Walnut Grove
Rio Vista
Isleton
Lodi
SUISUN MARSH
Mallard Slough Pump Station
C.C.W.D. CANAL
Oakley
Stockton
Pumping Plant No. 4
Pumping Plant No. 3
Pumping Plant No. 2
Pumping Plant No. 1
Brentwood
Rock Slough Intake
Old River Pump Station
Lathrop
Manteca
Tracy Pumping Plant
South Bay Pumping Plant
Tracy Pumping Plant
Tracy
Legend
Public Water Supply
State Water Project Facilities
Delta Cross Channel Gate
Barker Slough Pumping Plant
CCWD Pumping Plants
Harvey O. Banks DWR Pumping Plant
Tracy Pumping Plant
South Bay Pumping Plant
Mokelumne Aqueduct
Canals
Folsom South Canal Preferred Alignment
State Water Project Waterways
Freeport Pipe Route Preferred
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream; river; reservoir
Delta Cross Channel
CA Water
CA Counties
Legal Delta
Suisun Marsh
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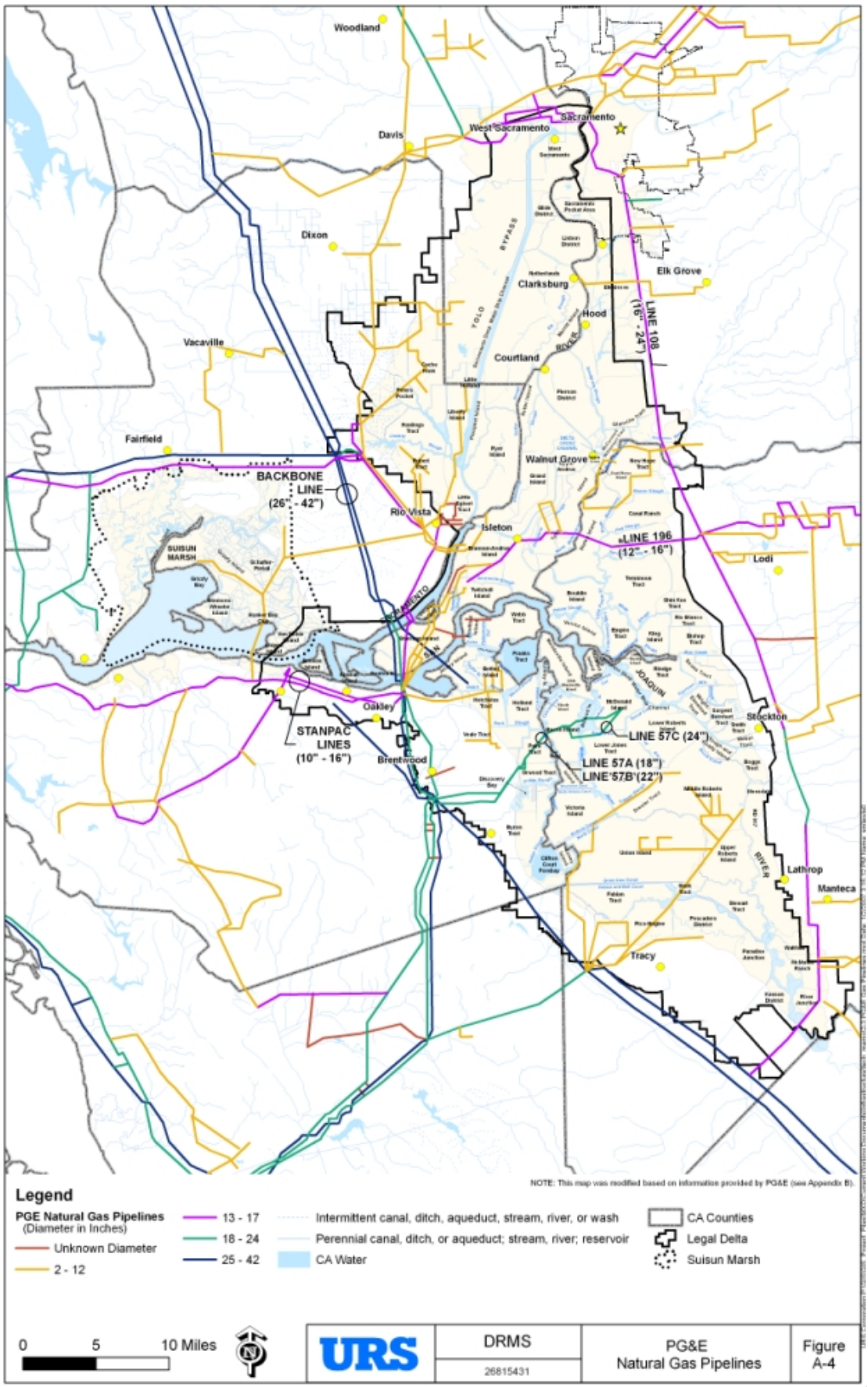
Water Wells, Canals & Mokelumne Aqueduct
Figure A-3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Courtland
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Fairfield
Walnut Grove
Rio Vista
Isleton
Lodi
Oakley
Brentwood
Stockton
Lathrop
Manteca
Tracy
BACKBONE LINE (26" - 42")
LINE 196 (12" - 16")
LINE 108 (16" - 24")
STANPAC LINES (10" - 16")
LINE 57C (24")
LINE 57A (18")
LINE 57B (22")
SUISUN MARSH
NOTE: This map was modified based on information provided by PG&E (see Appendix B).
Legend
PGE Natural Gas Pipelines (Diameter in Inches)
Unknown Diameter
2 - 12
13 - 17
18 - 24
25 - 42
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream, river; reservoir
CA Water
CA Counties
Legal Delta
Suisun Marsh
0 5 10 Miles
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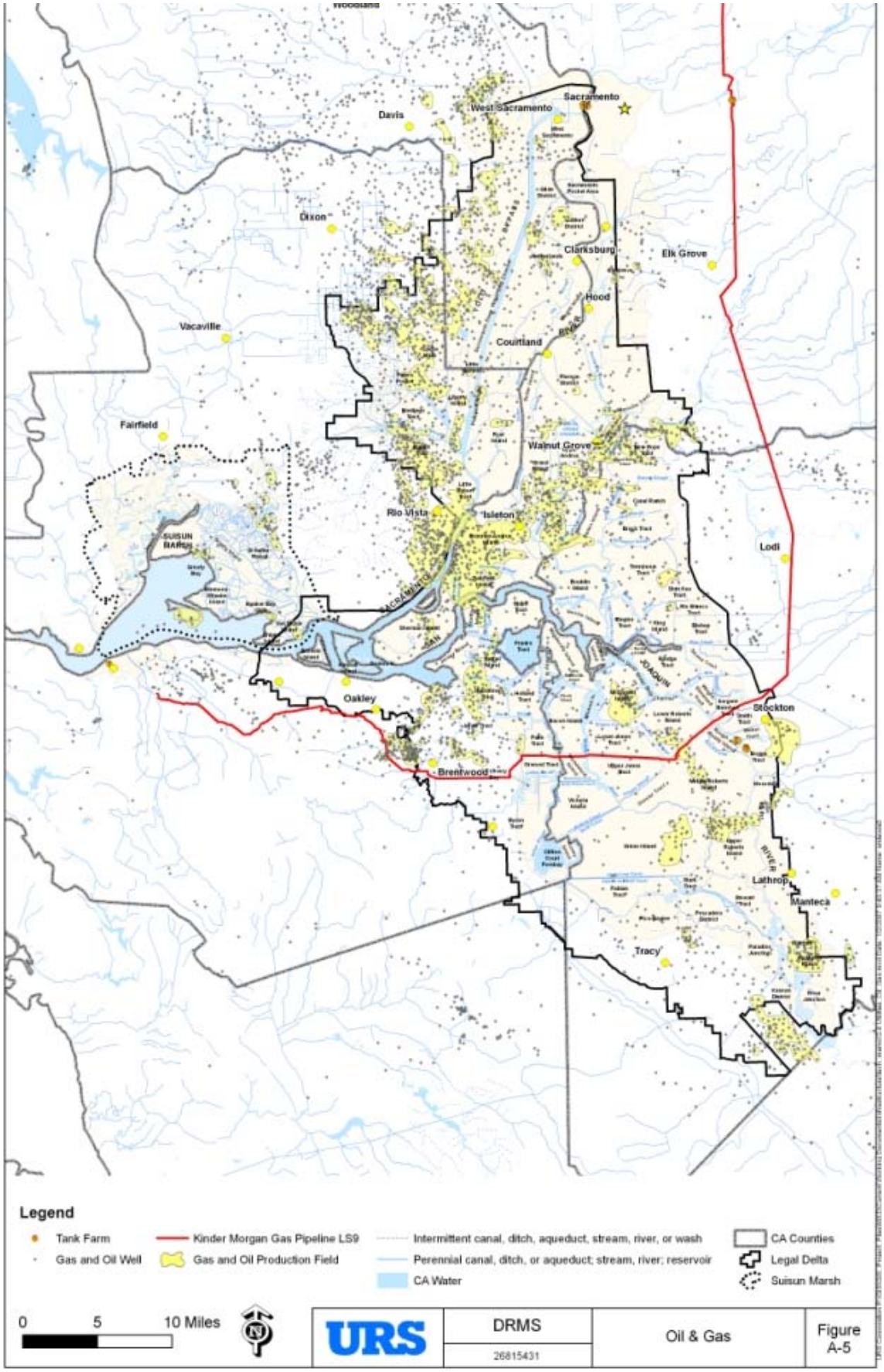
PG&E Natural Gas Pipelines
Figure A-4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Elk Grove
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Courtland
Vacaville
Fairfield
Walnut Grove
Rio Vista
Isleton
Lodi
SUISUN MARSH
Oakley
Stockton
Brentwood
Lathrop
Manteca
Tracy
Legend
Tank Farm
Gas and Oil Well
Kinder Morgan Gas Pipeline LS9
Gas and Oil Production Field
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream, river; reservoir
CA Water
CA Counties
Legal Delta
Suisun Marsh
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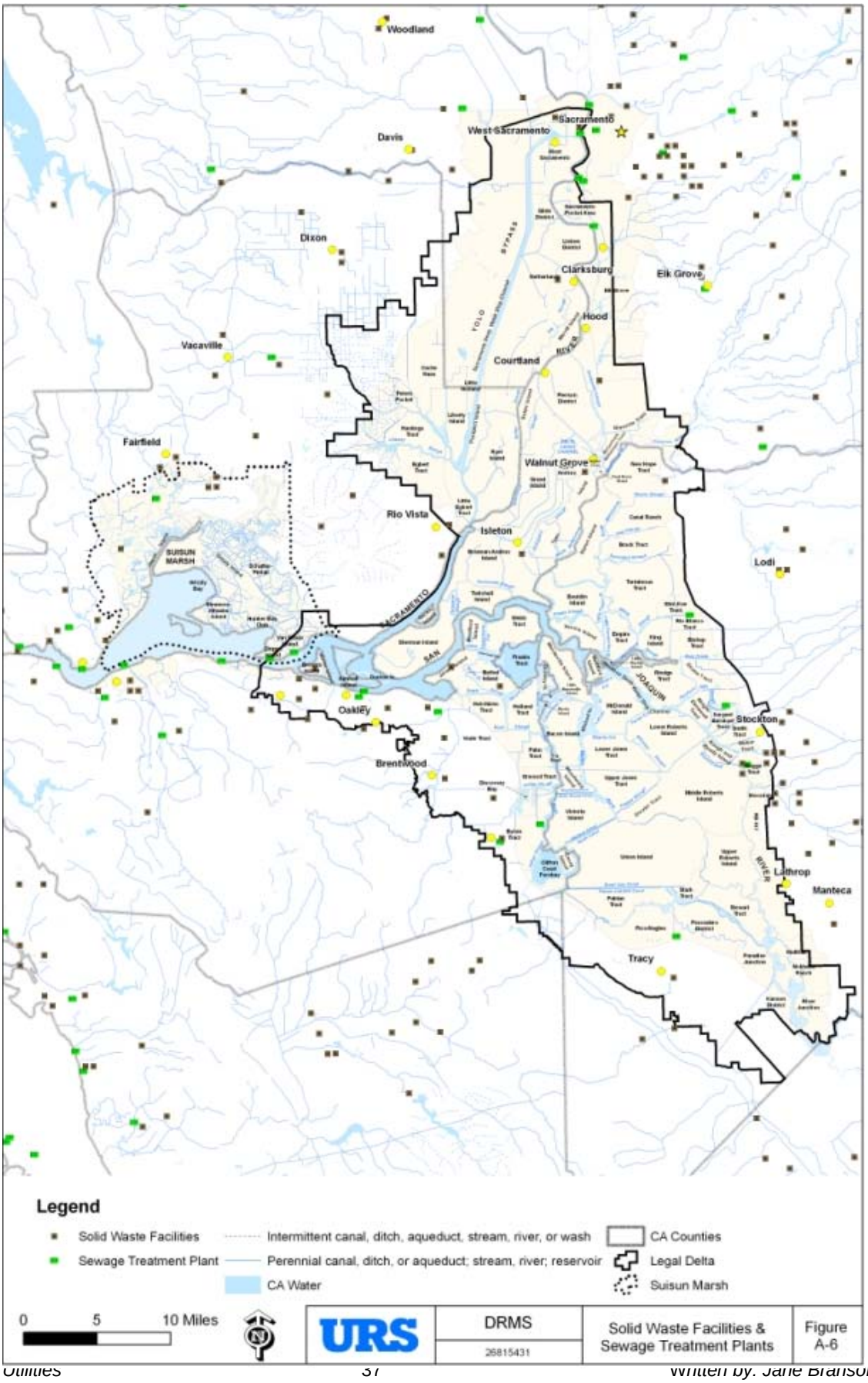
Oil & Gas
Figure A-5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Courtland
Fairfield
Walnut Grove
Rio Vista
Isleton
Lodi
SUISUN MARSH
SACRAMENTO
SAN JOAQUIN
Oakley
Stockton
Brentwood
Lathrop
Manteca
Tracy
Legend
Solid Waste Facilities
Sewage Treatment Plant
Intermittent canal, ditch, aqueduct, stream, river, or wash
Perennial canal, ditch, or aqueduct; stream, river; reservoir
CA Water
CA Counties
Legal Delta
Suisun Marsh
0
5
10 Miles
URS
DRMS
26815431
Solid Waste Facilities & Sewage Treatment Plants
Figure A-6